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TOWARDS A MULTIPLE-GOAL PURSUIT AND MULTILEVEL VIEW OF CONTINUING INFORMATION TECHNOLOGY USAGE: A PROCESS MODEL INTEGRATION AND A RESEARCH AGENDA

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Abstract:

The value of information technology (IT) is often realized when continuously being used after users' initial acceptance. However, previous research on continuing IT usage is limited for dismissing the importance of mental goals in directing users' behaviors and for inadequately accommodating the group context of users. This in-progress paper offers a synthesis of several literature to conceptualize continuing IT usage as multilevel constructs and to view IT usage behavior as directed and energized by a set of mental goals. Drawing from the self-regulation theory in the social psychology, this paper proposes a process model, positioning continuing IT usage as multiple-goal pursuit. An agent-based modeling approach is suggested to further explore causal and analytical implications of the proposed process model.

Keywords: Continuing IT Use, IT Usage, Self-Regulation Theory, Goal-Directed Behavior, Multilevel Theory, Agent-Based Modeling, Computational Experimentation.

1 INTRODUCTION

Research in relation to the continuing (or discontinuing) Information Technology (IT) usage/use after users' initial acceptance/adoption, abounds in the literature (Ortiz de Guinea & Markus 2009) and is amongst the most important strategic research initiatives in the Information Systems (IS) research field (Benbasat & Zmud 2003; Straub & Del Giudice 2012). Most previous continuing IT usage research extends from the Technology Acceptance Model (TAM) (Davis 1989; Davis et al. 1989; Venkatesh & Davis 2000) and/or from the Expectation-Confirmation (or Expectation-Disconfirmation) Theory (ECT or EDT) (Oliver 1980). It is often suggested, continuing IT usage is determined by a user's intention to use IT and such intention is mainly affected by a set of antecedents, such as the attitude and subjective norm towards using IT (Karahanna et al. 1999; Venkatesh & Davis 2000; Bhattacharjee & Premkumar 2004; Bajaj & Nidumolu 1998), or the perceived usefulness and satisfaction with IT (Bhattacharjee 2001; Bhattacharjee & Premkumar 2004; Kim & Malhotra 2005).

However, previous research is criticized for dismissing the importance of motivational factors or the role of mental goals in directing behaviors and for inadequately accommodating the group context and the associated group-level influence in affecting continuing IT usage (Bagozzi 2007; Jasperson et al. 2005; Kim et al. 2005; Ortiz de Guinea & Markus 2009; Ahuja & Thatcher 2005). Recent theoretical and empirical evidences suggest studying continuing IT usage as goal attaining process may better reveal the underlying mechanisms motivating users to continue using IT (e.g., Ahuja & Thatcher 2005; Barnes 2011; Leonardi 2013; Bagozzi 2007; Carver & Scheier 1998). Further, perceiving user individuals as in groups instead of in isolation, may better characterize the real-world IT usage contexts (e.g., Burton-Jones & Gallivan 2007; DeSanctis & Poole 1994; DeSanctis et al. 2008; Kang et al. 2012; Sarker & Valacich 2010; Sarker et al. 2005).

The intent of this in-progress paper is to report on the synthesis of several literature for extending the understanding of continuing IT usage as goal-directed, embedded in group environments. In particular, drawing from the social psychology literature in relation to goal-directed behaviors (Carver & Scheier 1998) and the multilevel theories literature in the management (Kozlowski & Klein 2000; Rousseau 1985), this paper conceptualizes the continuing IT usage as multilevel constructs (Burton-Jones & Gallivan 2007), positioned within a multiple-goal pursuit process framework. To further explore potential implication, this paper suggests an agent-based modeling (also agent-based simulation) approach to operationalizing the proposed conceptual framework and therefore to empirically and systematically analyzing derivative implications.

The proposed research is anticipated to make two contributions to the field. The reconceptualization of the continuing IT usage and the proposed conceptual framework synthesize previous piecemeal thoughts of studying IT usage as goal-directed and of positioning IT usage within group contexts. Though previous research considered the IT usage as goal-directed or as multilevel constructs in various places (e.g., Burton-Jones & Gallivan 2007; Ahuja & Thatcher 2005; Leonardi 2013), a coherent, integrated framework is lacking. Thus, the proposed research builds upon previous thoughts and offers synergistic value for better understanding continuing IT usage.

Most previous research probes the continuing IT usage behavior through variance modeling approach. The proposed research differs from previous research in offering a process model understanding of continuing IT usage (Mohr 1982; Soh & Markus 1995) and in proposing a simulation approach to explore implication of the process model (Harrison et al. 2007). Process models or theories are useful in telling richer stories than variance modeling approach and in offering underlying explanations of (particularly, contingent and probabilistic) phenomena (Pentland 1999; Mohr 1982; Soh & Markus 1995). As such, the proposed continuing IT usage process model framework complements previous variance-model understanding, in revealing better stories and explanations. Further, the suggested simulation approach enables a systematic examination of potential implication and thus affords the emergence of analytical insights unlikely revealed in previous research (Davis et al. 2007; Bonabeau 2002; Harrison et al. 2007).

The remainder of this paper is organized as follows. The subsequent section overviews previous research on continuing IT usage and highlights limitations in the previous literature. The theoretical foundation for understanding continuing IT usage as goal-directed behavior is next reviewed. The conceptualization of continuing IT usage as multilevel constructs is illustrated. The multiple-goal pursuit process model is proposed. A simulation approach is suggested for further exploring potential implication of the proposed process model.

2 LITERATURE REVIEW

Continuing IT usage research is concerned with understanding users' IT usage behaviors after their initial adoption or acceptance of IT. This research remains to be an important and prevalent research topic in the IS field, evident in the studies labelled such as continuing, continued, or continual IT use (Bhattacharjee 2001; Khalifa & Liu 2007; Recker 2010; Limayem et al. 2007), post-adoption or post-adoptive IT use (Jasperson et al. 2005; Zhu & Kraemer 2005; Parthasarathy & Bhattacharjee 1998), extended use (Hsieh & Wang 2007), and adaptive use (Sun 2012). In these research, it is argued that IT usage is more appropriate to be separately studied in distinctive phases, namely, pre-adoption and post-adoption; with each phase related to a different set of antecedents (Bhattacharjee 2001; Jasperson et al. 2005).

Roughly, the continuing IT usage research emerges as two streams according to differing foundational theoretical backgrounds. The first stream of research on continuing IT usage follows the Technology Acceptance Model (TAM) (Davis 1989; Davis et al. 1989; Venkatesh & Davis 2000). TAM suggests users' intention to use IT is mainly determined by perceived usefulness (PU) and perceived ease of use (PEOU), with PU and PEOU characterizing a set of users' pre-acceptance beliefs (Davis 1989). Research of this stream extends TAM to more adequately account for post-adoption context, such as replacing pre-adoption beliefs with post-adoption beliefs, and/or including perceptions characterizing users' prior usage experience (Karahanna et al. 1999; Venkatesh & Davis 2000; Bajaj & Nidumolu 1998; Venkatesh et al. 2008).

The second stream of research derives from the consumer behavior literature. The most seminal work of this stream is the IS Continuance Model (Bhattacharjee 2001), which extends the Expectation-Confirmation (or Expectation-Disconfirmation) Theory (ECT) (or EDT) (Oliver 1980). In contrast to continuing IT usage research extended from TAM, the IS Continuance Model suggests that users' continuing IT usage intention is jointly determined by the satisfaction of prior IT usage experience and by the perceived usefulness of continuing usage (Bhattacharjee 2001). Research following the IS Continuance Model focuses on appropriating and testing the model in diverse practical contexts, or extending the model to integrate other consumer behavior theories (Hsieh & Wang 2007; Khalifa & Liu 2007; Deng et al. 2010; Recker 2010; Thong et al. 2006).

Though previous research on continuing IT usage offers useful several insights regarding post-adoption IT usage contexts, it is limited in two respects. First, previous research dismisses important roles of motivational factors and mental goal representations in guiding users' behaviors (Bagozzi 2007; Jasperson, Carter, & Zmud 2005; Kim et al. 2005; Ortiz de Guinea & Markus 2009; Ahuja & Thatcher 2005). Rather than acting in a chaotic manner, humans live for certain purposes and human behaviors are always directed by a set of mental goal representations (Bagozzi 2007; Carver & Scheier 1998). As such, much recent theoretical and empirical research argues that regarding IT usage as serving a purpose and thereby conceptualizing continuing IT usage as a goal-striving, or goal-attaining, process is essential (Ahuja & Thatcher 2005; Barnes 2011; Leonardi 2013). From this perspective, a behavioral action (such as the actual IT usage) is not an end of a causal link, but a start of subsequent, long-standing goal attainment processes that will induce further behavioral adjustment actions towards the goal (Bagozzi 2007; Carver & Scheier 1998). Thus, completing the causal linkage to include the goal constructs may better explain real forces underlying users' continuing IT usage.

Second, previous research fails to adequately accommodate the contexts of users working in groups as well as potential group-level factors when theorizing the continuing IT usage (Bagozzi 2007; Sarker & Valacich 2010; Sarker et al. 2005). Many IT users, in contemporary workplaces, (either formally or informally) work in groups. This is particularly evident for the use of collective or social technologies,

such as group communication software and email systems (Burton-Jones & Gallivan 2007; DeSanctis & Poole 1994; DeSanctis et al. 2008; Kang et al. 2012; Sarker & Valacich 2010; Sarker et al. 2005). The group contexts of users' continuing IT usage require conceiving individuals as in a group instead of in isolation. This alternative collective-level conception (Burton-Jones & Gallivan 2007) regards a group, when using IT, as consisting of a set of dynamically interacting users, rather than isolated users only capable of perceiving interpersonal influences (as regarded in TAM and its extension) (Bagozzi 2007). As such, better accommodating the group contexts of users will enable more comprehensive examination of the continuing IT usage.

To offset the above identified limitations, this research seeks to offer a synthesized, integrated view accommodating both the goal-directed nature and group contexts of continuing IT usage. To illustrate, the following section overviews the theoretical basis supporting the synthesized, integrated view.

3 THEORETICAL FOUNDATION

The formulation about goal-directed human behaviors in the social psychology field offers a solid theoretical foundation (Carver & Scheier 1998). The experimental psychology field has historically accumulated large amount of evidences implying the goal-directed nature of human behaviors. However, clarity is brought to the field only when these evidences are explicitly and comprehensively summarized in the pilot work labelled as the Self-Regulation Theory (Carver & Scheier 1998). This work analogizes the goal-directed nature of behaviors with a cybernetic view, in order to better understand how and why behaviors happen. It is argued (Carver & Scheier 1998, p. 2, emphasis added),

*The human behavior is a continual process of moving toward, and away from, various kinds of **mental goal representations**, and that this movement occurs by **a process of feedback control**. This view treats behavior as the consequence of an internal guidance system **inherent in the way living beings are organized** [...] we refer to the guidance process as **a system of self-regulation**.*

This system of self-regulation process precisely analogizes a negative feedback loop in the science of Cybernetics (Ashby 1961; Clark 1996; Wiener 1948). Figure 1 illustrates a negative feedback loop consisting of four basic components: an input function, a reference value, a comparator, and an output function. An input function can receive input or the perceived effects of behavior from the external environment. A reference value represents the mental goal or the standard for the effects of behavior. A comparator can discriminate received input against a reference value to produce an output through an output function. An output function is the produced behavioral action.

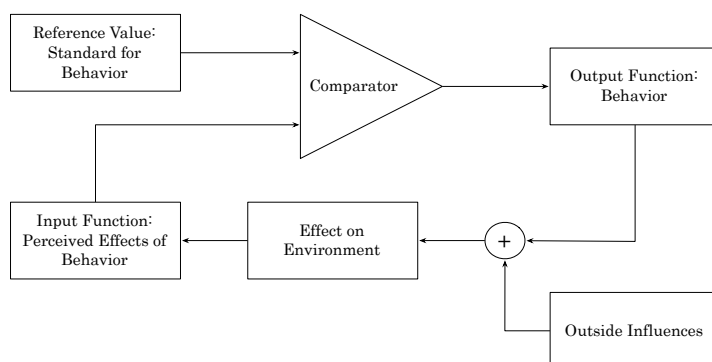


Figure 1. Negative Feedback Loop: Self-Regulation of Behavior (Carver & Scheier 1998)

The functioning of the system operates as follows: when receiving input (i.e., the perceived effects of behavior), the system compares the input against the reference value (i.e., the standard for behavior), and subsequently produces an output (i.e., behavior) that can minimize the discrepancy between the received input and the reference value, through impacting the external environment.

Human behaviors operate in similar fashion (Carver & Scheier 1998). Similar to cybernetic feedback, the system consisting of cognitive and behavioral processes of human beings is also 'purposive';

namely, the operating of the system serves a purpose or a goal. A goal is a reference value or a mental representation for human behavior. In defining goals, Carver & Scheier (1998, p. 65) submitted,

Goals energize and direct people's activities in organized ways [...] goals serve to engage the activities of those who adopt them [...] goals give meaning to people's lives [...] [in conclusion,] understanding a person means understanding the person's goals.

For instance, if one's goal is to achieve a certain level of performance when engaging a specific task, one's behavioral output (e.g., efforts spent on the task) moves towards the direction consistent with reducing the discrepancy between the goal and the perceived task performance feedback; for example, through devoting more efforts if the perceived feedback is lower than the value specified in one's goal.

The Self-Regulation Theory offers a useful perspective for transforming the view of conceptualizing continuing IT usage. To demonstrate, it is worthwhile to explicitly formulate continuing IT usage as a goal pursuit process grounded on the theoretical basis, and to integrate the theoretical basis with both individual-level and group-level continuing IT usage conceptualizations.

4 CONCEPTUALIZING MULTILEVEL CONTINUING IT USAGE

Consistent with the multilevel theories literature in the management (House et al. 1995; Klein et al. 1994; Kozlowski & Klein 2000; Rousseau 1985), the continuing IT usage is conceptualized as multilevel constructs – existing at both the individual level of analysis and the group level of analysis (Burton-Jones & Gallivan 2007). Extended from prior literature, the individual-level IT usage is conceptualized as an individual user's employment of IT features in performing tasks, directed by the user's task-performance goals and regulated by the user's perceived task-performance feedback (Burton-Jones & Straub 2006; Griffith 1999; Carver & Scheier 1998). This conceptualization extends but also differs from prior literature. First, consistent with prior literature (Burton-Jones & Straub 2006), the individual-level IT usage focuses on the usage behavior of IT features (Griffith 1999). A fine-grained feature-centric view is particularly useful in studying continuing IT usage (Jaspersen et al. 2005), as the change of post-adoption behavioral patterns may only occur at a system-feature level rather than at a whole IT system level, such as in mandatory IT usage context (Sun 2012; Leonardi 2013). Second, performing tasks with IT is a behavioral action concurrently and inseparably associated with the continuing IT usage behaviors. Thus, continuing IT usage is only representing an intermediate behavioral end for striving to attain task-performing goals (Bagozzi 2007; Carver & Scheier 1998). In other words, the attainment of task performance goals (as opposed to performing tasks) is the final aim for the employment of IT features. As such, the IT usage behavioral process is directed by the goals and regulated by the perceived task-performance feedback (Carver & Scheier 1998). The modified conceptualization is more attuned to the goal-directed nature of behavior and thereby allows in-depth exploration of motivational factors affecting IT usage.

Further, depending on the nature of the employed IT features and of the performed tasks (Burton-Jones & Straub 2006), the individual-level IT usage can be differentiated as two types: individual-task-focused (ITF) IT usage and group-task-focused (GTF) IT usage. The ITF IT usage refers to the employment of IT features primarily for performing individual tasks, such as the use of document editing software or the use of financial report preparation systems (Burton-Jones & Straub 2006). In contrast, the GTF IT usage is concerned with the employment of IT features mainly for performing group tasks (also termed collaborative tasks), such as the use of group decision support systems, teleconference technologies, email systems, virtual platform technologies, and alike (DeSanctis et al. 2008; DeSanctis & Poole 1994; Kang et al. 2012). The clarification is useful, as GTF IT usage, unlike ITF IT usage, is often most efficient only when a group collectively uses the exact same technology (Kang et al. 2012). In addition, the psychology literature in relation to multiple-goal pursuit points out that a person may and often must simultaneously accommodate multiple goals in any situation (e.g., being efficient in work and being happy) (Carver & Scheier 1998; DeShon et al. 2004; Schmidt & DeShon 2007; Schmidt & Dolis 2009; Schmidt et al. 2009; Vancouver et al. 2010). As such, the clarification, enabling a fine-grained distinction between individual and team goals, is consistent with the more realistic multiple-goal pursuit situations.

The group-level IT usage is conceptualized as the patterned behaviors of group users' employment of IT features in performing tasks to improve the group performance (Burton-Jones & Gallivan 2007; Kozlowski and Klein 2000). This patterned behaviors emerge from the social interaction among group users (DeSanctis & Poole 1994). Three points deserve clarification. First, the group-level IT usage exists at the collective level (i.e., group level) but originated from an individual level (i.e., user level). However, it leaves the underlying structure of the group-level IT usage (e.g., interacting patterns) unspecified (Morgeson & Hofmann 1999), thereby permitting theoretical extension to contextualized conceptualizations¹. Second, the function, referring to the direct consequence or outcome, of the group-level IT usage construct is specified as to better predict group performance (Morgeson & Hofmann 1999; Burton-Jones & Gallivan 2007). Third, the conceptualization of group-level IT usage, unlike individual-level IT usage, is not intended to suggest or imply the goals of the group-level IT usage behaviors. Rather, it is acknowledged the goals of group-level IT usage may be different from and be more than a simple, unified group task performance goal².

5 A MULTIPLE-GOAL PURSUIT PROCESS MODEL

Based on the conceptualizations of continuing IT usage, a process model framework is proposed, aiming at synthesizing, integrating, and visualizing the multiple-goal pursuit IT usage process (Mohr 1982). Figure 2 illustrates the process model, characterizing a user's IT usage processes. Note that the process model, though involving both individual task and group task, on its own is not a multilevel model, as the process is specific to an individual user. Nonetheless, it is useful in informing further elaborating a potential multilevel model (as further illustrated in the subsequent section). Further, the model is a dynamic, recursive, evolutionary model. The ending of events in the right extreme (i.e., "Compare Individual-Group G-P Discrepancies" in Figure 2) is also the start of future events in the next time period. To simplify illustration, the event in the right end is linked back to the beginning events, representative of the recursive, evolutionary, dynamic nature of the model. The following illustrates the detail of the process model.

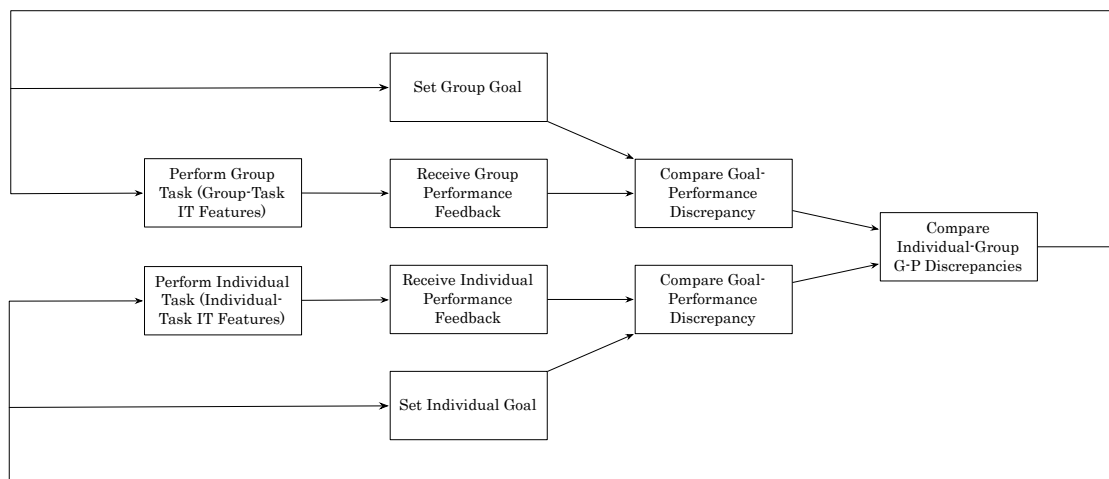


Figure 2. Continuing IT Usage as a Multiple-Goal Pursuit Dual Process

A multiple-goal pursuit scenario is well explicated and supported in recent psychological studies (DeShon et al. 2004; Schmidt et al. 2009; Schmidt & Dolis 2009; Schmidt & DeShon 2007; Vancouver et al. 2010). It is suggested individual users, when tackling both individual-task-focused

¹ This is consistent with the intent of the suggested simulation approach for theory building, further illustrated in §6 and §7.

² Without considering users' personal goals, the group-level IT usage, as a patterned behavior, is likely to be only directed by the shared group task performance goal. However, when users' differing goals are taken into consideration, the patterned behaviors may also be directed by the goals emerged from interactions of users' personal goals. Given previous literature is silent on non-shared group goals, conceptualizing the group-level IT usage goals requires future research.

IT usage and group-task-focused IT usage, need to simultaneously pursue both goals of individual performance and group performance. As such, users will frequently direct attention from one task-focused action to another, in order to better attain both goals. Thus, the performing of individual task and the performing of group task occur almost simultaneously in a relatively long term – representing dual processes of performing tasks.

P1: In a group environment, an individual user employs IT features to perform tasks in a dual process. In particular, a user simultaneously performs both individual tasks and group tasks in order to strive to achieve both individual performance goal and group performance goal.

Further, an individual user is anticipated to receive certain level of performance feedback once tasks are performed and performance is generated. In an extreme condition, performance feedback is zero. In most other situations, depending on the actual level of performance, the received feedback is either positive (e.g., rewards) or negative (e.g., criticism). An individual user, when perceiving individual-task performance and group-task performance feedback, seeks to either consciously or unconsciously compare the performance feedback against the corresponding goal – the individual-task performance feedback with the individual performance goal and the group-task performance feedback with the group performance goal (Carver & Scheier 1998).

P2: In a group environment, an individual user receives performance feedback from both individual-task performance and group-task performance, and compares individual-task performance feedback against individual performance goal and group-task performance feedback against group performance goal.

The produced two discrepancies from the dual task performing process will interact and compete with each other, to jointly regulate an individual's behavioral output (Carver & Scheier 1998). Specifically, much empirical evidence suggests a person tends to focus on more pressing matters (Carver & Scheier 1998; DeShon et al. 2004). Namely, when resources are sufficient, an individual user will put more resources in both individual task and group task to reduce both discrepancies. Otherwise, an individual user often prioritizes tasks with higher magnitude of discrepancies between the performance feedback of that task and the corresponding performance goal. The resultant behavioral output is the rescheduling of task-performing actions or the resetting performance goals. To reduce the more pressing discrepancy, an individual user may first attempt to reallocate more resources devoted to actions of performing tasks towards improving the performance of reducing that particular pressing discrepancy (Carver & Scheier 1998). Alternatively, a high level of discrepancy may result in individuals disengage or adjust their performance goals towards reducing that particular pressing discrepancy (Carver & Scheier 1998).

P3: In a group environment, an individual user simultaneously accommodates both individual performance-goal and group performance-goal discrepancies (derived from comparing feedback and goal). When resources are sufficient, an individual user tends to allocate more resources to reduce both discrepancies. When resources are insufficient and one discrepancy is more pressing than another, an individual user tends to prioritize the task associated with more pressing discrepancy to allocate more resources for reducing that particular discrepancy. Alternatively, an individual user, when perceiving an extreme high level of discrepancies, may disengage with the tasks or adjust performance goals, towards reducing the high-level discrepancies.

6 AGENT-BASED MODELING APPROACH

Though the process model is useful in offering a rich story about the multiple-goal pursuit nature of continuing IT usage at the individual level, it does not integrate the group-level IT usage and tells limited causal explanations. As such, this paper further suggests a simulation approach (in particular, agent-based modeling) to systematically examining potential causal and analytical implications of the proposed process model, and to seamlessly integrating the group-level IT usage with the individual-level IT usage in a mathematically formulated emergence process.

Simulation methods refer to the use of “computer software to model the operation of ‘real-world’ processes, systems, or events” (Davis et al. 2007, p. 481). In applying simulation methods, a theoretical model is first operationalized as a formal mathematical model and subsequently is translated to a computational model (i.e., a model with the form of computer codes).

This paper suggests the agent-based modeling (ABM) approach, as it is one of the most extensively applied simulation methods in modeling social, behavioral phenomena (Bonabeau 2002; Harrison et al. 2007). ABM allows examining emergent macro-level patterns of phenomena through modeling micro-level processes, systems, and events (Anderson 1999). The approach, perhaps relatively new to most IS researchers, demonstrates clear value in several recent studies (e.g., Canessa & Riolo 2006; Chang et al. 2010; Nan 2011; Nan & Johnston 2009; Rivkin & Siggelkow 2003). It is particularly useful in exploring complex, nonlinear, and analytically unsolvable phenomena (Harrison et al. 2007).

As previously suggested, the group-level IT usage emerges from social interactions among individual users. Applying ABM thus allows directly characterize and specify the simple and exact interacting patterns of the individual-level IT usages in mathematical formulation. Therefore, the group-level IT usage, though can not be reduced to a simple mathematical equation of the individual-level IT usage, can be “populated” through the step-by-step computer calculation specified in the model. The specification of group-level IT usage is the particular strength of applying ABM – the examination of the higher-level patterns without knowing the lower-level complexities often required, for example, in variance-based modeling approach.

Following this logic, future research will develop a mathematical model accurately reflecting the theoretical logic of the proposed process model and IT usage conceptualizations. For example, priorities of future research may include specifying the nature of group task, the corresponding group-task performance structure, and the communication and group-task collaboration structure (McGrath 1984; Steiner 1972; Shiflett 1979).

Together with the simulation modeling approach, this paper further suggests conduct of computational experimentation – running the computational model in contained computer environment; this process analogous to controlled human experimentation. The intent of computational experimentation is (i) to provide initial model validation through comparing with reported findings in previous studies³ and (ii) to systematically examine causal and analytical implication. The following discusses potential ways and directions for such exploration.

7 DISCUSSION

The suggested computational experimentation may explore various unaddressed questions. For instance, the individual-task-focused and the group-task-focused IT features are often isolated for the convenience of investigation. In practical situations, however, due to potential technical and social constraints, IT features are often mixed and intertwined (DeSanctis & Poole 1994; Griffith 1999). The implication of such IT feature interrelation remains unknown. For example, how does a user allocate resources in order to maximize performance when IT features are mixed such as in using Enterprise Systems? How should senior managers design performance feedback to appropriately accommodate such technological and social constraints?

Further, though individual and group performance feedback could be given unambiguously, firms may only reward or punish employees based on group performances, leaving individual performances undisclosed. In such situations, the feedback system is misleading and therefore ineffective in guiding employees. It is intriguing to ask, how is unrevealing individual performance feedback likely to affect a user’s actual goal pursuit behavior and the user’s effective employment of IT features?

³ The validation process is consistent with several methodological recommendations in the literature (Burton & Obel 1995; Carley 1996; Davis et al. 2007; Harrison et al. 2007) and is applied in several recent studies (e.g., Nan 2011; Nan & Johnston 2009; Zott 2003).

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